
XX. *On a Fossil Shell of a fibrous Structure, the Fragments of which occur abundantly in the Chalk Strata and in the Flints accompanying it. By Mr. James Sowerby, F.L.S. &c.*

Read November 1, 1814.

HAVING, with many others, experienced the want of sufficient information to discriminate the genera to which certain shells belong, and not being satisfied with what has been done, especially regarding the genera of fossil shells, I am induced to offer the following observations to the Linnean Society, in the hope that some person, who has more leisure, experience and judgment than myself, will in the course of time favour us with some further elucidation of so interesting a subject.

I hope I may be pardoned for the length of the detail which I am about to lay before the Society, because accurate distinctions and observations are found to be more than ever necessary in the present discerning age, in which such a multiplicity of subjects necessarily arise to improve science.

In a memoir on the mineralogical geography of the environs of Paris, under the article "Chalk Formation," by Messieurs Cuvier and Brongniart, in the *Annales du Muséum d'Histoire Naturelle*, tom. xi. p. 293, there are mentioned "some fragments of shells, which from their tabular form and fibrous structure cannot be referred to other than the genus *Pinna*; but if we were to infer from the thickness of the fragments the size of the individuals to which they must have belonged, we must con-

clude that these testacea must have been monstrous. We measured one 12 millimetres ($\cdot 47$ of an inch) thick, while the largest kind of pinna known is only $\cdot 08$ of an inch thick." Conceiving that I knew these fragments from their fibrous structure, I felt satisfied from the active state of inquiry that it would soon be understood, and for some time I paid very little attention to the subject; but my friends from time to time sending me specimens, none of which gave me the idea of a pinna, I was induced to imagine that this common shelly substance varied much in form, and so much so, that the generic names sent with specimens also varied, and that it would eventually prove to form a distinct genus. In the opinion that the striated fossil spoken of by Brongniart and Cuvier is the same as those sent to me from various places, I am confirmed by a remark of the Rev. W. Conybeare, in the second volume of the *Transactions of the Geological Society*, where I find several specimens figured, and the following observation: "the flat surface of a flint has been originally occupied by a large piece of the *striated shell*, the fragments of which occur so abundantly in the chalk strata and accompanying the flints, *being very commonly considered as mutilated portions of fossil pinnæ*." At page 179 of the same work it is mentioned, that there are found in the chalk with flints, "a longitudinal transversely rugose ostrea-form bivalve, of a fibrous structure, and fragments of another fibrous shell of a large size and unknown genus." The expressive figures annexed to Mr. Conybeare's paper confirm my suspicions as to the identity of these shells, but not that they belong to the *Pinna* genus; indeed, from a fragment of a hinge mentioned by Cuvier as in the collection of M. Defrance, I am happy to find that, greatly coincident with my own opinion and observations, some doubt has arisen and suspicion been created that these shells are not *Pinnæ*.

About twenty-three years since, before my time was so much
occupied

occupied as it has been during that period in drawing and engraving English botany, &c. in my way to Cambridge I stopped long enough at Royston to run up to a chalk-pit, where I picked up a small specimen of this shell, but altogether the most perfect one I have ever met with, with respect to the information which may be obtained from it. A year or two since, the penetrating Miss Benett, of Norton-House, Wilts, collected in abundance some shells very much resembling a sort of muscle, which she sent me, and of which the better specimens were returned after I had made such observations as I desired. On returning them, I observed to her, that the hinge might be discovered if some of the chalk were carefully removed, and I find the hint was taken. At the same time, upon a careful examination and comparison of my own Royston specimen with a few parts of hinges which I had collected together, and which were generally considered as belonging to this shell, I was enabled to determine with accuracy the proper character and situation of the hinge; from which it became quite easy to see that the difficulty of ascertaining its genus was owing principally to our ignorance of those important points. I now beg leave to lay before this Society the result of my inquiries, and of the comparison of numerous specimens varying in size, shape and locality.

Genus. INOCERAMUS*.

DEFINITION OF THE GENUS. An irregular gibbous beaked bivalve shell, of a fibrous structure. Hinge forming a long furrow, transverse to the beak, lateral, linear, divided by numerous sulci across it. Cartilage partly external, partly internal. No visible muscular impression.

This genus will be found sufficiently distinct from *Perna* and

* Ab ἱς fibra et χέραμος testa.

Crenatula in many particulars, although apparently related to them in its hinge: it consists entirely of a substance composed of parallel perpendicular fibres, and much more conspicuously so than *Pinna* or any other genus.

From specimens in my possession I have made the outlines I now present to the Society, TAB. XXV. It will be easily seen how Cuvier and Brongniart had it not in their power to understand the fragments they found, and how such fragments might mislead any one. They are found in the flints and among the chalk, both hard and soft, in all those places where chalk occurs in England, &c. The shells are from an inch to two feet or more in length, and generally very thin for their size, except at the hinge and extremities. The hinge is generally lost or closely enveloped in the chalk or flint, so as to be concealed, or else it lies in confusion among the fragments. The part behind the hinge or beak is of the finest possible thinness, while some of the other extremities and the hinge are many lines thicker than the more central parts. A shell of about three inches in diameter may be about the tenth of an inch thick; and I have one, which if perfect would be about eighteen inches in diameter, not half an inch thick: there are found fragments even larger, which undoubtedly belong to this genus. I have one five-eighths of an inch thick, from Wiltshire. Thus, if we were to infer from the thickness of the fragments the size of the individuals to which they must have appertained, supposing them to belong to the genus *Pinna*, we must conclude that these testacea would have been *indeed monstrous*: but when it is known that they form a peculiarly characterized genus of a less regular construction, we may form a much more moderate idea of them. Upon a fair calculation, the specimen measuring five-eighths of an inch thick must have formed part of a shell two feet six inches long; whereas, had it been originally part of a pinna, if calculated according

according to the proportions of one in my possession two feet long, the shell to which it belonged must have been at least twenty feet long. Indeed I have fragments of a fossil shell, apparently belonging to this genus, found near Bath and Oxford*, which upon such a calculation must have formed parts of shells at least 120 feet long. I learn from my kind friend Mr. Gideon Mantell, of Lewes, that this species of shell may be traced on the face of some of the chalk cliffs sometimes to four or five feet in diameter. They are accompanied in general by the *Plagiostoma spinosa*, tab. 78. *Min. Conc.*, and some other curious species not before settled.

That species of this genus of which I have chiefly spoken I would distinguish by the specific name *Cuvieri*, in honour of the extensive abilities of the discerning Cuvier.

In many places a fibrous secretion of carbonate of lime, much resembling this, sometimes occurs from very thin to many inches thick, spreading in a stratified manner over many acres, which might from the structure be taken for fibrous shell. See *Brit. Min. t.* 345, middle figure. I have specimens, by the kind attention of Miss E. Benett, found at Osmington, the fibres of which are very thin, and five inches long, yet by various specimens they may be traced to the form of the cone in cone coral (as it is commonly called), a peculiar crystallization. *Brit. Min. t.* 149.

Having said thus much in hopes of assisting and gaining information, I must now add a few words in explanation of the

* *Brit. Min. t.* 345, the upper and lower figures, express such fragments: and on the 1st of June 1818, I had the pleasure of receiving, by the favour of an intelligent and kind friend, from near Caen in Normandy, two pieces, one with the hinge, and another with the muscular impression, both resembling *Ostrea*: possibly these may lead, as the former, to a more marked attention and complete discovery. If an oyster, it is entitled to a name expressing its more extraordinary fibrous distinction.

drawing, Tab. XXV. It represents a piece of chalk from Sussex, which had a number of fragments apparently belonging to one large shell, of the inside of which the chalk itself appears to have been a nearly complete cast, showing the undulations as well as the thickness and distance of the overhanging striae, all corresponding in proportion to smaller specimens: to this I have added, in dots, the outer margin and the hinge in proper proportions, fig. 1. Thus there is no doubt that these shells have been very large; and this leads to the conclusion, that they must have grown very fast, or have been some time in a quiet situation, and in immense quantities, before the catastrophe that enveloped them in the chalk and in the infiltrated flints of large dimensions, as well as in small pebbles. For more accurate information as to the general outline of the large figure, I have added an inner view of the Royston specimen, showing the hinge and parts of the opposite shell broken, the lower edge appearing about the middle, and the rest filled with chalk, fig. 2.; also a view of the outer part of the shell, showing the general contour, fig. 3.